STAT [redacted]

ELECTROPHOTOGRAPHIC PROCESSING TECHNIQUES

STAT CONTRACT NO. [redacted] TASK ORDER NO. 03(100,762)05-R

Monthly Narrative Report - October 1965

This is the fourth of a series of monthly narrative reports on a study of electrophotographic processing techniques. The study comprises the investigation and development of photographic and electronic techniques for processing photographic images. This report covers the work performed by the [redacted] STAT

STAT [redacted] during the period from 22 September to 22 October 1965.

A. Current Status of Work

1. Photographic Processing

The key to photographic processing will be control of acutance and granularity in processed transparencies by adjustment of density thresholds, expansion and contraction of densities, and variation of the illuminating spot from a modulated-light printing source. The feasibility of these photographic techniques has been demonstrated to a limited extent with specific images. An important objective of the current program is the development of these and related techniques for processing photographic images in general. With the view towards improving photographic image perceptibility, an orderly schedule of analysis and experimentation is being pursued.

Prior to the start of this investigation, it was determined that special test equipment would be required. In addition, calibration of this equipment, to reproduce experimental results and properly relate the findings to relevant efforts, must be performed. Almost all of the special test equipment required for photographic processing has been received and installed in a new photographic laboratory. The calibration phase of the study,

which has occupied much of the effort to date, is nearly complete.

A basic element of the proposed photographic processing system is an experimental modulated-light contact printer, which is now under final development. By employing negative feedback, this electronic printer will effect large-area contrast compression as a first step in the processing of transparencies. All the electronic components have been assembled on a standard equipment rack; however, delays in the fabrication of mechanical parts to attach to a drill press column have been experienced. Construction of this item is planned for completion during the next monthly period.

In addition to these tasks, preliminary selection of films for use with the Miller-Holzwarth high-resolution contact printer, another element of the photographic processing system, has been made. The selected films comprise SO 3404, SO 5427, SO 2427, Gravure and Ortho Type 3, all Eastman Kodak products. Also, film chip number 5, one of a set of chips supplied by the Technical Representative of the Contracting Officer, was experimentally programmed for density plotting by the isodensitracer. The results will help establish the location of density components to be modified for image sharpness.

Concurrent with these efforts, a review of GEMS and Edge-GEMS for application to this program is being performed.

2. Electronic Processing

The key to electronic processing, analogous to photographic processing, will be separate and simultaneous operation on the high and low frequency information in photographic images. Development of a breadboard high-resolution electronic processing system for improving photographic image perceptibility is based upon pursuit of an orderly schedule of analysis and experimentation.

A preliminary analysis led to the design, construction and assembly of breadboard equipment to evaluate critical aspects and demonstrate operating principles of a proposed two-kinescope

processing system. Experiments with this equipment provided satisfactory resolution of the problems of achieving system stability with a wideband, high-gain feedback system; and of achieving high system signal-to-noise ratios when unexposed films (along with given transparencies) are placed in the light path of the sensor.

Feasibility of the proposed system having been demonstrated, the design of electronic filters for the feedback loop of the breadboard high-resolution electronic processing system was begun. At present, the system incorporates (equivalent) registered negative and positive light masks for photographic images. Introduction of the electronic filters will permit separate operation on the high and low frequency information.

The present equipment employs standard kinescopes and unidirectional scan by the kinescopes' electron beams. The breadboard high-resolution system will employ a high-resolution kinescope (as a source of modulated light), which has been ordered, and box-type (triangular horizontal and vertical) scan by the beams. Equipment to produce box scanning, whose feasibility was demonstrated during a previous study completed in 1964, is now under evaluation; final specification will be made at the start of the next monthly period.

Concurrent with these efforts, the investigation and the evaluation of other electronic techniques are continuing in light of the overall program objectives.

B. Problem Areas Encountered

1. Photographic Processing

STAT a. The [redacted] sensitometer still has not been delivered; it is now expected to arrive in early-November. This item is not critical to the performance of projected tasks for the next monthly period; however, efforts to speed-up delivery of this item are still being pursued.

b. Unanticipated delays in the fabrication of parts, delays resulting from the huge backlog of machine shop orders, are effecting the schedule for construction of

processing system. Experiments with this equipment provided satisfactory resolution of the problems of achieving system stability with a wideband, high-gain feedback system; and of achieving high system signal-to-noise ratios when unexposed films (along with given transparencies) are placed in the light path of the sensor.

Feasibility of the proposed system having been demonstrated, the design of electronic filters for the feedback loop of the breadboard high-resolution electronic processing system was begun. At present, the system incorporates (equivalent) registered negative and positive light masks for photographic images. Introduction of the electronic filters will permit separate operation on the high and low frequency information.

The present equipment employs standard kinescopes and uni-directional scan by the kinescopes' electron beams. The breadboard high-resolution system will employ a high-resolution kinescope (as a source of modulated light), which has been ordered, and box-type (triangular horizontal and vertical) scan by the beams. Equipment to produce box scanning, whose feasibility was demonstrated during a previous study completed in 1964, is now under evaluation; final specification will be made at the start of the next monthly period.

Concurrent with these efforts, the investigation and the evaluation of other electronic techniques are continuing in light of the overall program objectives.

B. Problem Areas Encountered

1. Photographic Processing

STAT a. The [redacted] sensitometer still has not been delivered; it is now expected to arrive in early-November. This item is not critical to the performance of projected tasks for the next monthly period; however, efforts to speed-up delivery of this item are still being pursued.

b. Unanticipated delays in the fabrication of parts, delays resulting from the huge backlog of machine shop orders, are affecting the schedule for construction of

the modulated-light contact printer. Delivery of this experimental equipment to the photographic laboratory is now planned for 17 November; the schedule of tasks has been revised accordingly.

2. Electronic Processing

A review of the breadboard electronic processing equipment requirements, in light of the overall program objectives, has led to an investigation of a new [redacted] deflection yoke driver. This dual-driver [redacted] can drive two yokes and operate at frequencies as high as 22 KHz; previously approved equipment cannot operate at frequencies greater than 10-13 KHz. Preliminary indications are that this new driver is more compatible with the system resolution (greater than 25 cycles/mm) and format (2" x 2") goals.

STAT
STAT

C. Projected Work for Next Monthly Period

1. Photographic Processing

a. Perform calibration of the microcopier.

b. Incorporate the microcopier in the film characteristics measurements program.

c. Complete construction of the modulated-light contact printer.

d. Perform calibration of the modulated-light contact printer.

e. Review proposed photographic processing techniques with respect to repeatability of density reproduction.

2. Electronic Processing

a. Continue design of the electronic filters for the feedback loop of the breadboard high-resolution electronic processing system.

b. Continue investigation and evaluation of electronic techniques in light of the overall program objectives.

STAT

E. Documentation of Verbal Commitments and/or Agreements During the Period

No special verbal commitments nor agreements were made during the period.